

CLAIMS

1. A process for making a thermoplastic vulcanizate (TPV) in a reactor, the process comprising:
 - a) forming a mixture in which a silane grafted resilient polymer component is dispersed in a thermoplastic matrix component by mixing in the reactor:
 - i) from 25 to 60 parts by weight of a resilient polymer component, per 100 parts by weight of the matrix component and resilient polymer component combined;
 - ii) from 40 to 75 parts by weight of the matrix component, per 100 parts by weight of the matrix component and the resilient polymer component combined; and
 - iii) a silane grafting agent, and
 - b) adding a solid water-generating agent to the reactor to crosslink the silane grafted resilient polymer component.
2. The process of claim 1 wherein step a) further comprises mixing a free radical generator in the reactor.
3. The process of claim 2 wherein the free radical generator is a peroxide.
4. The process of claim 1 wherein step a) further comprises mixing a hydrolysis catalyst in the reactor.
5. The process of claim 2 wherein step a) further comprises mixing a hydrolysis catalyst in the reactor.
6. The process of claim 5 wherein the silane grafting agent, free radical generator, and hydrolysis catalyst are added as individual components to the reactor.

7. The process of claim 5 wherein the silane grafting agent, free radical generator, and hydrolysis catalyst are added to the reactor as a mixture on a porous carrier polymer.
8. The process of claim 7 wherein the porous carrier polymer is selected from the group consisting of polyethylene and polypropylene.
9. The process of claim 1 wherein the silane grafting agent is a vinylalkoxysilane.
10. The process of claim 9 wherein the vinylalkoxysilane is selected from the group consisting of vinylmethoxysilane and vinylethoxysilane.
11. The process of claim 1 wherein the solid water-generating agent is selected from the group consisting of a metal oxide/carboxylic acid combination, Epsom salt, Glauber's salt, clay, water, talc, and combinations thereof.
12. The process of claim 1 wherein the matrix component comprises at least one of a polyolefin, a polyamide, and a polyester.
13. The process of claim 1 wherein the resilient polymer component comprises at least one of halobutyl rubber, ethylene-propylene rubber, ethylene-propylene-diene terpolymer rubber, natural rubber, synthetic rubber, amine functionalized synthetic rubber, and epoxy functionalized synthetic rubber.
14. The process of claim 1 wherein the resilient polymer component is an ethylene interpolymer.
15. The process of claim 1 wherein step a) includes mixing from 25 to 35 parts by weight of the resilient polymer component and from 65 to 75 parts by weight of the matrix component, per 100 parts by weight of the matrix component and resilient polymer component combined.

16. The process of claim 1 wherein step a) includes mixing 30 parts by weight of the resilient polymer component and 70 parts by weight of the matrix component, per 100 parts by weight of the matrix component and resilient polymer component combined.

17. The process of claim 1 wherein the reactor is a batch-type compounding apparatus.

18. The process of claim 1 wherein the reactor is a continuous-type compounding apparatus.

19. The process of claim 1 wherein the reactor is connected to a die suitable for extruding the product in the reactor into a shaped, fabricated product without an intervening pelletization step.

20. The process of claim 1 wherein the matrix component has a crystallinity as determined by DSC of at least 40% and the resilient polymer component has a crystallinity as determined by DSC of no more than 40%.

21. The process of claim 20 wherein the crystallinity of the matrix component and the resilient polymer component differ by at least 10%.

22. The process of claim 20 wherein the crystallinity of the matrix component and the resilient polymer component differ by at least 20%.

23. The process of claim 1 wherein the matrix component and the resilient polymer component are blended and simultaneously combined with the silane grafting agent.

EP Claims

24. Process for making a thermoplastic vulcanizate (TPV) comprising:

A) blending a thermoplastic polymer component for forming a continuous matrix phase having a crystallinity as determined by DSC of at least 40%, a resilient polymer component having a crystallinity as determined by DSC of less than 40%, and a silane grafting agent for forming a phase dispersed in the matrix and additives so as to promote silane grafting; and

B) adding a solid water generating agent, which releases water, while the blend formed in step A) is submitted to shear so as to crosslink the silane grafted polymer.

25. Process according to claim 24 in which the polymer for the matrix phase and that for the resilient polymer component are blended and simultaneously combined with the silane grafting agent and additives.

26. Process according to Claim 24 or Claim 25 in which the silane grafting agent and additives are part of a masterbatch, preferably comprising as a solid carrier a polymer compatible with the resilient polymer component.

27. Process according to any of the preceding claims in which the solid water generating agent is a compound containing adsorbed or hydrated water releasable upon heating to the blending temperature, preferably with a hydrolysis catalyst or a compound which can react to release water added with the silane grafting agent.

28. Process according to any of the preceding claims in which the components are blended in batch or continuously operated blending equipment.

29. Process according to any of the preceding claims in which Steps A and B are contiguous without any intermediate cessation of blending or solidification of the polymer components.

30. Process according to any of the preceding claims wherein resilient polymer component is an ethylene interpolymer.

31. Process according to any of the preceding claims in which the crystallinity of the thermoplastic polymer component and the resilient polymer component differ by at least 10%, preferably at least 20%.

32. Process according to any of the preceding claims in which the resilient polymer component has a heat of fusion of less than 40 J/g, preferably less than 30 J/g.

33. Process according to any of the preceding claims in which there are blended in step A) from 40 to 75 parts, preferably from 65 to 75 parts, and more preferably 70 parts, by weight of the thermoplastic polymer component and from 25 to 60 parts, preferably from 25 to 35 parts, and more preferably 30 parts, by weight of the resilient polymer component.

34. Process according to any of the preceding claims in which the thermoplastic polymer component comprises at least one of a polyolefin, a polyamide, and a polyester.

35. Process according to any of the preceding claims in which the silane grafting agent is a vinylalkoxysilane, preferably vinylmethoxysilane or vinyllethoxysilane.

36. Process according to any of the preceding claims in which the solid water-generating agent is a metal oxide/carboxylic acid combination, Epsom salt, Glauber's salt, clay, water, talc, or any combination thereof.